SEASONAL FOOD PREFERENCE OF THE INDIAN SHORT NOSED FRUIT BAT *CYNOPTERUS SPHINX* (VAHL) (CHIROPTERA: PTEROPODIDAE)[1]

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The short-nosed fruit bat *Cynopterus sphinx* occurs widely in India. These plant-visiting bats feed upon fruits, leaves and flowers. They also modify the leaves of certain plants as "tents" for roosting. Since the availability of fruits and flowers is seasonal, their food items vary over the seasons. In addition to feeding on fruits and flowers, these bats also feed on the leaves of *Cassia fistula* throughout the year. Such folivory of these bats may be energetically more advantageous to them than frugivory.

Introduction

A number of neotropical and palaeotropical bats are known to modify leaves of plants as "tents" for use as daytime roosts (Barbour 1932). The Indian short-nosed fruit bat *Cynopterus sphinx* roosts in modified leaves of the creeper *Vernonia scandens* and mast tree *Polyalthia longifolia* (Balasingh *et al.* 1993). Plant-visiting bats from both the neotropics and palaeotropics are known to feed on different plant parts such as flowers, pollen, fruit, nectar and leaves (Kunz and Diaz 1995). In all, 250 species of bats representing two families (Phyllostomidae and Pteropodidae) depend on plants as a source of food (Fleming 1988). McCann (1940) observed *C. sphinx* feeding on ripe dates. He concluded that these bats drank the juice and discarded the pulp.

The available information relating to the food habits of *C. sphinx* was mainly based on casual or incidental observations which have been reviewed and summarized. Considering the paucity of information on food habits of *C. sphinx* in southern India, the present study was

Table 1
FOOD PLANTS OF *CYNOPTERUS SPHINX*

Family	Species	Food type
Annonaceae	*Polyalthia longifolia* Thw.	Fruit
	Annona squamosa Linn.	Fruit
Moraceae	*Ficus bengalensis* Linn.	Fruit
	Ficus religiosa Linn.	Fruit
	Morus alba Linn.	Fruit
Mimosaceae	*Enterolobium saman*	Fruit
	Pithecellobium dulce Benth.	Fruit
	Acacia nilotica Linn.	Fruit
Sapotaceae	*Achras zapota* Linn.	Fruit
	Bassia latifolia Roxb.	Fruit & Flowers
	Mimusops elengi Linn.	Fruit
Myrtaceae	*Psidium guajava* Linn.	Fruit
	Eugenia jambolana Lam.	Fruit
Combretaceae	*Terminalia catappa* Linn.	Fruit
Caesalpiniaceae	*Cassia fistula* Linn.	Leaves
Anacardiaceae	*Mangifera indica* Linn.	Fruit & Flowers
Rutaceae	*Murraya koenigii* Sperg.	Fruit
Clusiaceae	*Calophyllum inophyllum* Linn.	Fruit
Punicaceae	*Punica granatum* Linn.	Fruit
Meliaceae	*Azadirachta indica* A. Juss.	Fruit
Cucurbitaceae	*Cephalandra indica* Naud.	Fruit
Solanaceae	*Solanum torvum* Sw.	Fruit
Rhamnaceae	*Ziziphus jujuba* Mill.	Fruit

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TABLE 2
FEEDING SEASONALITY OF *C. SPHINX* ON DIFFERENT SPECIES OF PLANTS

Species	Parts eaten	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Polyalthia longifolia	Fruit	+	+	-	-	-	-	-	+	+	+	+	+
Annona squamosa	Fruit	-	-	-	-	-	+	-	-	-	-	+	-
Ficus bengalensis	Fruit	+	+	-	-	+	-	+	+	-	-	-	-
Ficus religiosa	Fruit	-	-	+	+	+	-	-	+	+	-	-	+
Morus alba	Fruit	-	-	-	-	+	+	-	-	-	+	+	-
Enterolobium saman	Fruit	-	-	-	-	+	+	-	-	-	-	-	-
Pithecellobium dulce	Fruit	-	-	-	-	+	+	+	-	-	-	-	-
Acacia nilotica	Fruit	-	-	-	-	-	-	-	-	+	+	-	-
Achras zapota	Fruit	+	+	-	+	-	-	-	-	-	-	-	-
Bassia latifolia	Flowers	-	-	-	-	+	-	-	-	-	-	-	-
Bassia latifolia	Fruit	-	-	-	-	-	-	-	+	+	+	-	-
Mimusops elengi	Fruit	-	-	-	+	+	+	+	-	-	-	-	-
Psidium guajava	Fruit	-	-	-	+	+	+	-	-	-	-	-	-
Eugenia jambolana	Fruit	-	-	-	-	-	-	-	-	+	-	-	-
Terminalia catappa	Fruit	-	+	+	+	+	+	+	+	-	-	-	-
Cassia fistula	Leaves	+	+	+	+	+	+	+	+	+	+	+	+
Mangifera indica	Flowers	-	-	-	+	+	-	-	-	-	-	-	-
Mangifera indica	Fruit	-	-	-	-	-	+	+	-	-	-	-	-
Murraya koenigii	Fruit	-	-	-	-	-	-	-	-	-	+	-	-
Calophyllum inophyllum	Fruit	-	-	-	+	+	+	+	-	-	-	-	-
Punica granatum	Fruit	-	-	-	-	-	-	-	-	+	+	-	-
Azadirachta indica	Fruit	-	-	-	-	-	-	-	+	+	+	-	-
Cephalandra indica	Fruit	+	-	-	+	+	-	+	-	-	+	-	+
Solanum torvum	Fruit	+	-	-	-	-	+	-	-	-	-	-	-
Ziziphus jujuba	Fruit	-	-	-	+	+	-	-	-	-	-	-	-
Vitis vinifera	Fruit	-	-	-	-	-	-	+	-	-	-	-	-
Lannea coromandelica	Fruit	-	-	-	-	-	-	+	-	-	-	-	-

+: Presence of fruits/flowers/leaves.

undertaken to determine the seasonal food preference and feeding behaviour of *C. sphinx.*

Study Area and Methods

Studies were carried out (November 95-October 96) around the campus of the Madurai Kamaraj University (9° 58' N lat.; 78° 10' E long.).

Seeds and a large number of partially chewed fragments of plant parts were dropped by *C. sphinx* beneath the feeding roost and day roost "tents". The plants ingested were identified by the seeds, fibre pellets, and leaves, which were collected under feeding roosts and "tents". These remnants were collected in the early morning hours on alternate days of our study period. In addition, observations were also made in different fruiting seasons, on the bats while they were feeding at the feeding perches, and in the "tents" during the night with the help of red filtered torch light (> 610 nm).

The flowering, fruiting and the availability of different food items during different months of the year were recorded.

Observations

Day roosts of *C. sphinx* (numbers varying from 2 to 11 individuals) were located by tracing the fecal pellets and remains of fruit, leaves and flowers. Six day roosts with a single bat or small groups were located under a funnel and boat shaped tents made out of dry fronds of palmyra palm, *Borassus flabellifer.* Most of these roosts are used for weeks or months, and as a "maternity home''.

While returning from foraging, *C. sphinx* carry different parts of plants to the day roosting sites. If the fruits are too large to transport (e.g. *Annona squamosa*, *Mangifera indica*, *Psidium guajava*) they are consumed *in situ* on the fruiting trees. The food of *C. sphinx* is listed in Table 1. The seasonal availability of plant food on which the bats feed are listed in Table 2.

In the present study, *C. sphinx* was observed to feed on 25 plant species. This bat mostly prefer the fruit of *Terminalia catappa*, which is available for a longer duration over the season (7 months). Various species of pteropodid bats, including *Cynopterus,* have been reported to forage on the fruits of more than 30 species of plants in tropical and subtropical regions (Fujita 1991).

C. sphinx also feeds regularly on the leaves of *C. fistula.* This was also observed by Balasubramanian (1988) and Bhat (1994). Such folivory may be energetically more advantageous for the bats than the ingestion of abundant amounts of low-protein fruits (Kunz and Ingalls 1994). Marshall (1983) observed that *C. sphinx* feed on flowers of several plant species.

Bhat (1994) observed *C. sphinx* feeding only on the flowers of *Parkia biglandulosa,* and *Madhuca latifolia.* However, during the present study we observed that *C. sphinx* also feed on the flowers of *Bassia latifolia* and *Mangifera indica.* The foraging strategy of these bats, therefore, depends on the availability, apart from their preference, of different plant parts throughout the year.

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